DOCUMENT RESUME

ED 223 625 TM 820 313

TITLE	Science Library of Test Items. Volume Thirteen. Mastery Testing Program. [Mastery Tests Series 5.] Tests M51-M65.
INSTITUTION	New South Wales Dept. of Education, Sydney (Australia).
PUB DATE	[80]
NOTE	64p.; The Library of Test Items series includes ED 218 284-299, TM 820 303-321, and TM 820 892-895. For related documents, see TM 820 303 and TM 820 308-312.
PUB TYPE	Tests/Evaluation Instruments (160)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	Foreign Countries; *Item Banks; *Mastery Tests; Natural Sciences; *Science Tests; Secondary Education; Secondary School Science; *Test Construction; *Testing Programs
IDENTIFIERS	*Assessment Instruments; *Australia (New South Wales)

ABSTRACT

As part of a series of tests to measure mastery of specific skills in the natural sciences, copies of tests 51 through 65 include: (51) interpreting atomic and mass numbers; (52) extrapolating from a geological map; (53) matching geological sections and maps; (54) identifying parts of the human eye; (55) identifying the functions of parts of a plant; (56) interpreting food test results; (57) applying the theory of mechanical advantage; (58) reading a linear rule; (59) reading a circular scale; (60) predicting ratios in genetics; (61) reading a flow diagram; (62) using a flow chart of physical processes; (63) interpreting a flow chart of operations; (64) using codes; and (65) naming carbon compounds. The multiple choice questions were written for students in grades 7 through 10. Teachers' notes and scoring information are provided for each test. (CM)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED223625

New South Wales **Department of Education**

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

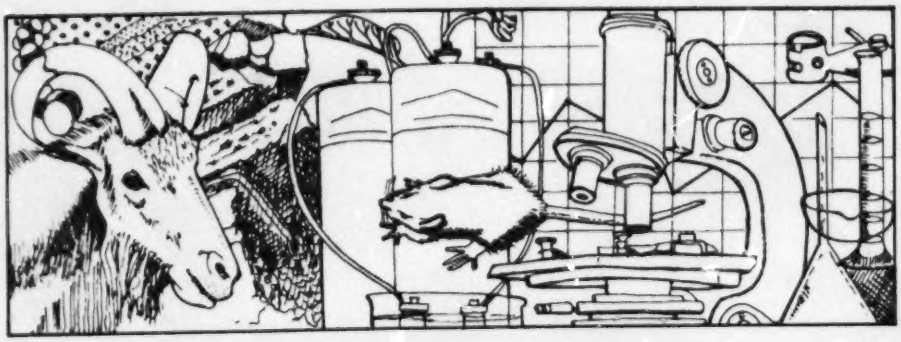
This document has been reproduced as received from the person or organization originating it.

Minor changes have been made to improve reproduction quality.

Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

SCIENCE

MASTERY TESTING PROGRAM



SETS OF MULTIPLE COPIES OF EACH TEST M51 - M65
TEST KEYS ARE SUPPLIED ON THE NEXT PAGE OF THIS ISSUE.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

J. Cook

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

SERIES 5

TM 820 313

VOLUME 13 OF SCIENCE LIBRARY OF TEST ITEMS.

SCIENCE

MASTERY TESTING PROGRAM : KEYS

TEST No.	QUESTION																			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
M51	A	B	D	C	C	C	D	B	B	A	C	D	A	D	B	•	•	•	•	•
M52	C	D	B	D	A	B	D	A	B	A	B	D	A	C	D	•	•	•	•	•
M53	B	A	C	A	D	C	D	C	B	B	•	•	•	•	•	•	•	•	•	•
M54	B	A	D	C	C	A	B	D	A	B	A	B	C	C	B	C	A	B	B	C
M55	D	A	B	C	B	B	D	C	C	A	B	D	B	A	B	•	•	•	•	•
M56	A	D	B	C	B	B	B	C	D	A	B	C	A	B	C	D	C	D	A	B
M57	A	D	B	D	B	A	D	D	D	B	C	A	C	A	B	B	A	C	A	C
M58	B	A	C	C	D	D	C	D	D	D	A	C	B	C	B	D	C	A	B	D
M59	A	D	D	B	D	C	B	A	C	A	C	B	B	C	C	C	A	B	D	D
M60	A	C	A	C	D	A	B	C	A	C	D	C	A	B	B	•	•	•	•	•
M61	B	A	B	D	C	C	B	A	D	C	A	C	A	B	B	•	•	•	•	•
M62	D	C	C	D	B	B	C	D	C	A	A	B	C	D	C	•	•	•	•	•
M63	A	C	C	B	D	C	A	B	A	D	•	•	•	•	•	•	•	•	•	•
M64	B	D	D	A	C	A	C	D	B	D	•	•	•	•	•	•	•	•	•	•
M65	B	C	C	A	D	A	D	C	B	C	•	•	•	•	•	•	•	•	•	•

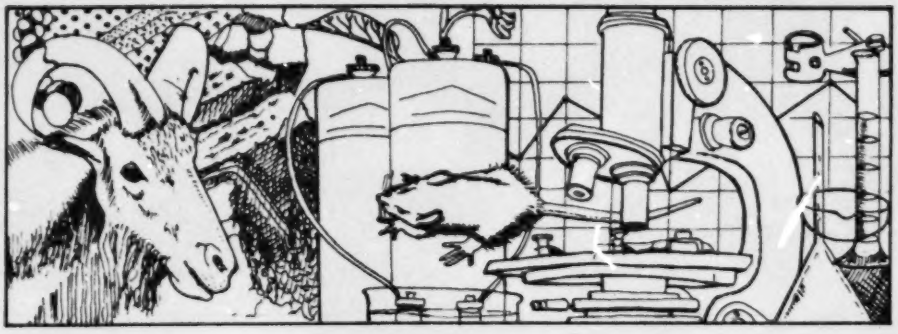
SERIES 5

M 51

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAM



A MASTERY TEST FOR
THE SKILL OF
INTERPRETING ATOMIC NUMBERS
AND MASS NUMBERS

ATOMIC AND MASS NUMBERS

This test is designed to measure your ability to use a convention to determine the numbers of protons, electrons and neutrons in atoms.

Scientists often use the following convention to represent the atomic structure of an element.

Choose the alternative which best completes each statement, and mark its letter (A, B, C or D) on your answer sheet.

Question	Statement	Alternatives			
		A	B	C	D
1.	The number of protons in an atom with the symbol $^{6}_{3}X$ is:	3	6	9	18
2.	The number of protons in an atom with the symbol $^{22}_{10}Y$ is:	5	10	12	32
3.	An atom with 7 protons only could have the symbol:	$^{8}_{15}Q$	$^{11}_{4}Q$	$^{7}_{15}Q$	$^{15}_{7}Q$
4.	An atom with 9 protons only could have the symbol:	$^{5}_{4}P$	$^{11}_{20}R$	$^{18}_{9}R$	$^{9}_{18}R$
5.	The atom that has 2 protons only is:	$^{1}_{1}V$	$^{2}_{1}W$	$^{4}_{2}X$	$^{6}_{3}Y$

SET 2

Question	Statement	Alternatives			
		A	B	C	D
6.	The atom that has 4 neutrons is:	$^{2}_{2}X$	$^{4}_{2}X$	$^{7}_{3}X$	$^{9}_{4}X$
7.	An atom with 10 neutrons could have the symbol	$^{7}_{3}Y$	$^{5}_{2}Y$	$^{10}_{5}Y$	$^{20}_{10}Y$
8.	The number of neutrons in an atom with the symbol $^{235}_{92}U$ is	92	143	235	327
9.	The number of neutrons in an atom with the symbol $^{2}_{1}H$ is	0	1	2	3
10.	The atom with the largest numbers of neutrons is:	$^{12}_{4}V$	$^{13}_{6}W$	$^{14}_{7}X$	$^{15}_{8}Y$

SET 3

Question	Statement	Alternatives			
		A	B	C	D
11.	The atom that has 5 electrons is:	$^{3}_{2}X$	$^{10}_{2}X$	$^{10}_{5}X$	$^{15}_{10}X$
12.	An atom with 3 electrons could have the symbol:	$^{2}_{1}Y$	$^{3}_{1}Y$	$^{5}_{2}Y$	$^{6}_{3}Y$
13.	The number of electrons in the atom $^{19}_{9}F$ is	9	10	19	28
14.	The atom with the largest number of electrons is	$^{2}_{1}Q$	$^{5}_{2}Q$	$^{7}_{3}Q$	$^{6}_{4}Q$
15.	The atom with the smallest number of electrons is	$^{3}_{3}R$	$^{4}_{2}R$	$^{5}_{4}R$	$^{8}_{5}R$

TEACHERS' NOTES

This test is designed to determine whether or not the student can use atomic number and mass number to calculate the number of protons, neutrons and electrons in atoms.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher, but *in general it should not be more than 80%* **(8 out of 10, 12 out of 15, or 16 out of 20). The most important question to ask is: if the test has sets, did the student do poorly on one or more sets? "Poorly" here would usually be taken as 80% (4 out of 5 or 8 out of 10). It is for this reason that the cumulative percentages shown in earlier tests have been dropped for tests after M38.**

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Lack of familiarity with the proton-neutron-electron model of the atom.

Lack of familiarity with the notation convention ${}^{A}_{Z}X$

Confusion of one or more of protons, neutrons and electrons with another of the particles.

Pretest experience shows that students usually get the whole of a set right, or none right. In many cases, the successful strategy used in Set 1 was repeated in Set 2 (unsuccessfully!). This needs to be watched.

Related tests:

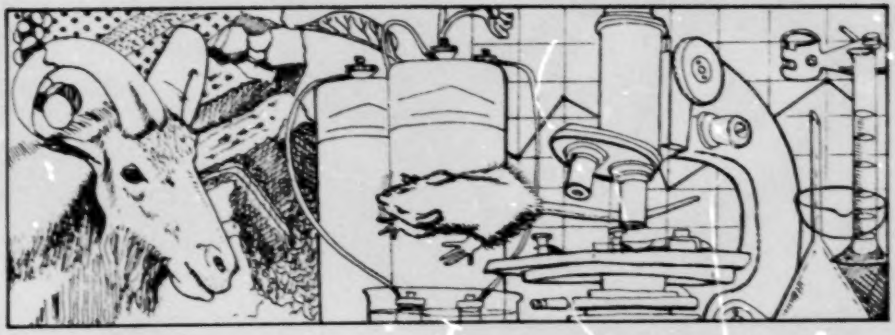
M45 Applying a novel theory.

M52

New South Wales **Department of Education**

SCIENCE

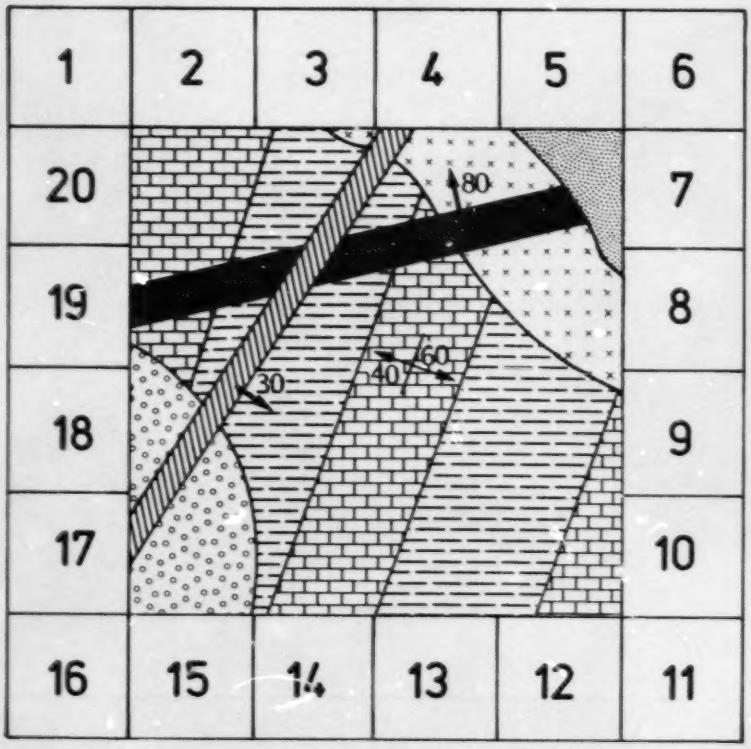
MASTERY TESTING PROGRAMME



A MASTERY TEST FOR
THE SKILL OF
EXTRAPOLATING FROM
A GEOLOGICAL MAP

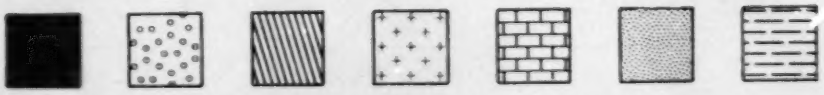
GEOLOGICAL MAPPING

This test is designed to measure your ability to read and extrapolate from a geological map and to determine information from it. All questions refer to this map.



Scale: 1 km = 1 cm

KEY:



SET 1

In the next five questions identify the rock which would most probably occur in the named square. Find it in the list of possible answers and mark its letter (A,B,C or D) on your answer sheet.

Question	Square	POSSIBLE ANSWERS			
		A	B	C	D
1.	1	dolerite	granite	limestone	shale
2.	5	coal	granite	limestone	sandstone
3.	9	conglomerate	limestone	sandstone	shale
4.	13	conglomerate	limestone	sandstone	shale
5.	18	conglomerate	limestone	sandstone	shale

SET 2

In the next five questions identify the most common rock type which could be in the named square and mark its letter (A,B,C or D) on your answer sheet.

Question	Square	POSSIBLE ANSWERS			
		A	B	C	D
6.	3	dolerite	granite	limestone	shale
7.	7	coal	dolerite	granite	sandstone
8.	8	granite	limestone	sandstone	shale
9.	12	granite	limestone	sandstone	shale
10.	15	conglomerate	limestone	sandstone	shale

SET 3

In the next five questions choose the possible answer which best applies and write the letter (A,B,C or D) on your answer sheet.

Question		POSSIBLE ANSWERS			
		A	B	C	D
11.	In which square would you dig and strike pegmatite?	1	7	16	18
12.	Which square would contain sandstone and granite?	3	5	7	8
13.	In which square would shale NOT appear?	4	13	14	15
14.	Which square would contain most conglomerate?	16	17	18	19
15.	Which square would contain most rock types?	5	7	11	19

TEACHERS' NOTES

This test is designed to determine whether or not the student can make sensible conclusions about geological trends shown on an idealised map.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher, but *in general it should not be more than 80%* (12 out of 15). The most important question to ask is, did the student do poorly on one or more sets? "Poorly" here would usually be taken as 80% (4 out of 5 or 8 out of 10). It is for this reason that the cumulative percentages shown in earlier tests have been dropped for tests after M38.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets may indicate specific problems as indicated below:

Difficulties in following the map key.
Difficulties in extrapolating from the given data.
Difficulties in visualising the projected trends.

Related tests:

M16	Reading from a geological map.
M27	Reading from a grid map.
M47	Identifying trends in data.
M53	Interpreting a contour map.
021095	Reading a graph by interpolation.
021107	Matching geological sections and maps.

Related skills for which tests have not been prepared:

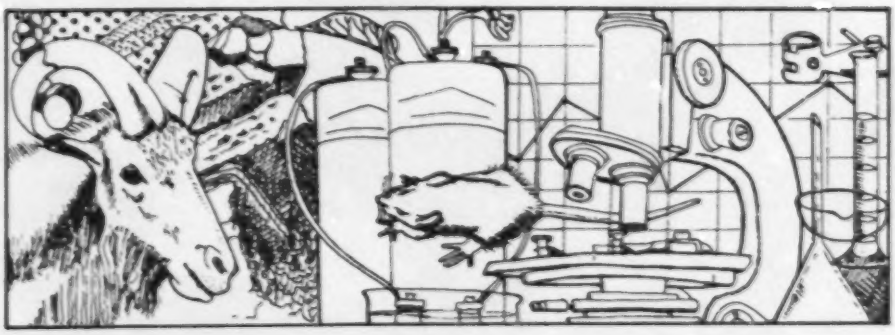
Drawing plan, section and contour maps from appropriate data
Writing geological histories of geological maps.
Constructing reference grids for maps

M53

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAM



A MASTERY TEST FOR
THE SKILL OF

MATCHING GEOLOGICAL
SECTIONS AND MAPS

12

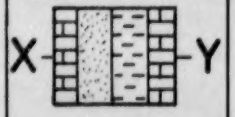
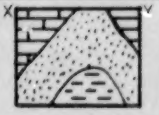
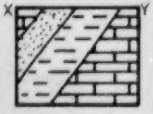
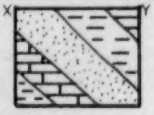
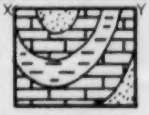
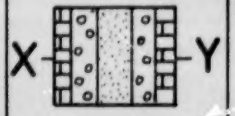
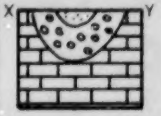
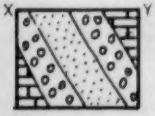
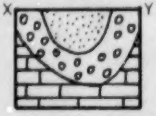
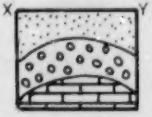
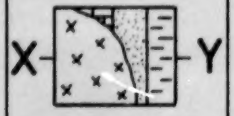
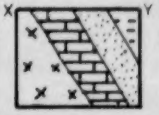
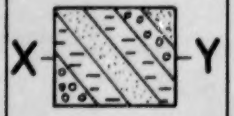
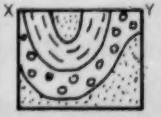
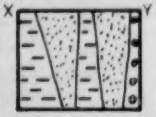
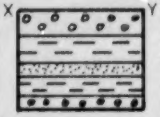
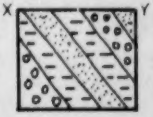
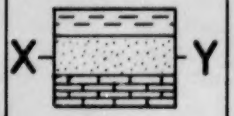
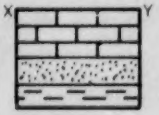
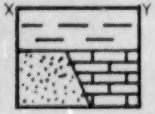
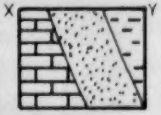
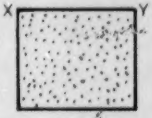
PLAN AND SECTION MAPS

This test is designed to measure your ability to recognise a geological section from a surface map.

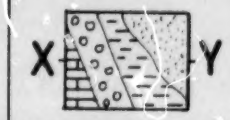
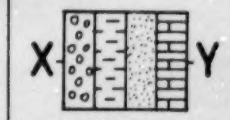
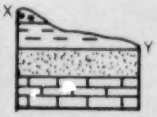
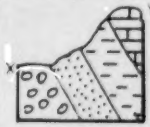
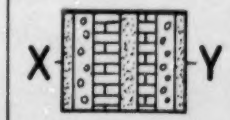
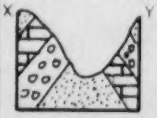
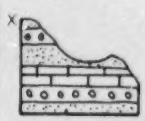
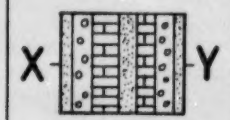
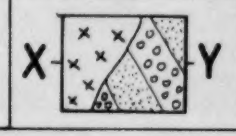
The questions below show a surface map and four alternative sections through the surface map along the line XY.

In each of the questions in Sets 1 and 2, choose the alternative which gives the most correct geological information for each section and write its letter (A, B, C or D) on your answer sheet.

SET 1

Q	Surface maps	SECTIONS A	B	C	D
1					
2					
3					
4					
5					

SET 2

Q.	Surface maps	SECTIONS			
		A	B	C	D
6					
7					
8					
9					
10					

TEACHERS' NOTES

This test is designed to determine whether or not the student can relate geological sections and geological surface maps.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher, but *in general it should not be more than 80%* (8 out of 10, 12 out of 15, or 16 out of 20). The most important question to ask is: if the test has sets, did the student do poorly on one or more sets? "Poorly" here would usually be taken as 80% (4 out of 5 or 8 out of 10). It is for this reason that the cumulative percentages shown in earlier tests have been dropped for tests after M38.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Both sets: Difficulties in transferring from the horizontal to the vertical.

Lack of familiarity with the connection between surface maps and sections.

Confusion between the maps and the sections.

Set 2: Difficulties in moving from an apparently flat surface map (Set 2) to a "contoured" map.

Related tests:

M16	Reading a geological map.
M52	Extrapolating from a geological map.
021028	Deducing geological history from a section.
021103	Interpreting a contour map.
021104	Correlating fossil sequences.

Related skills for which tests have not been prepared:

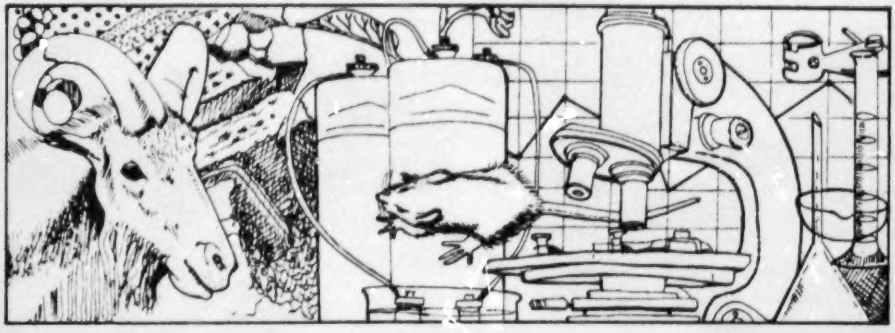
Drawing geological sections from surface maps.
Drawing contour maps.
Constructing surface maps from geological sections.
Writing geological histories from sections or surface maps.

M54

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAM

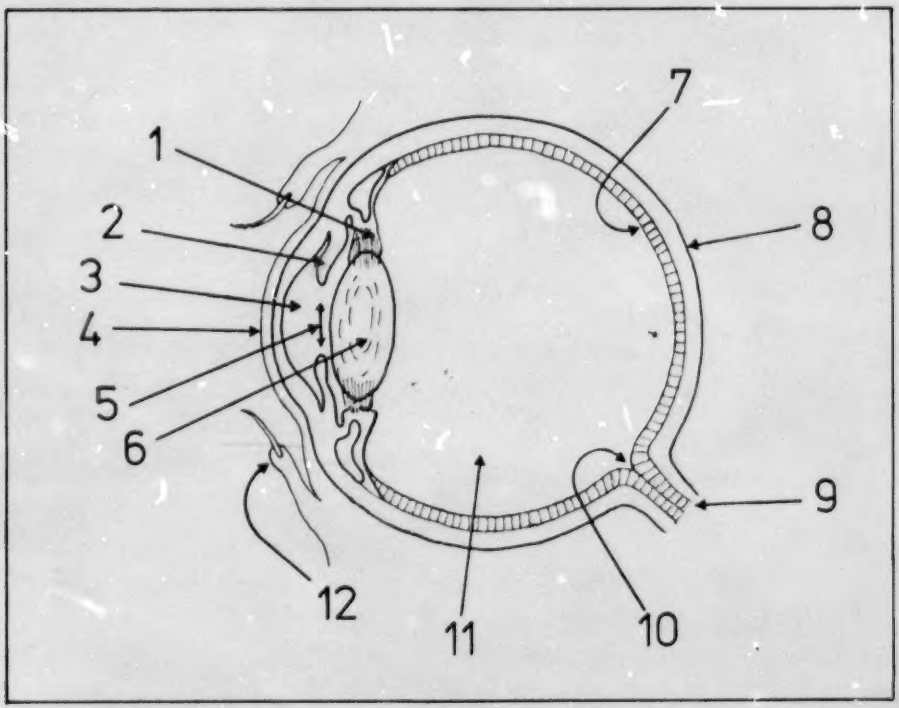


A MASTERY TEST FOR
THE SKILL OF

IDENTIFYING PARTS OF THE HUMAN
EYE AND THEIR FUNCTIONS

THE HUMAN EYE

This test is designed to measure your ability to name the parts of the human eye and name their functions. All questions in this test refer to this diagram:



SET 1

For each part, choose the name which fits it, and write the letter (A, B, C or D) which matches that name on your answer sheet.

QUESTION	PART	A	B	C	D
1	1	lens	muscle	retina	duct
2	2	iris	pupil	retina	eyelid
3	3	cornea	lens	iris	liquid
4	4	cover slip	eyelid	cornea	lens
5	5	hole	iris	pupil	muscle
6	6	lens	mirror	pupil	opening
7	7	nerves	retina	sclera	screen
8	8	film	black out	retina	sclera
9	9	optic nerve	blood vessel	artery	blind spot
10	10	nerve centre	blind spot	focus	film spot

SET 2

For each named function, choose the part of the eye which performs that function. Find the letter which matches that part, and write the letter (A, B, C or D) on your answer sheet.

QUESTION	FUNCTION	A	B	C	D
11	Changes the shape of lens	1	2	6	8
12	Varies the amount of light entering the eye	1	2	4	6
13	Focuses light rays	2	3	6	7
14	Transmits messages to the brain	7	8	9	12
15	Image forms on this	4	7	8	9
16	Keeps light out	1	6	8	11
17	Changes the focal length of the lens	1	2	6	8
18	Allows light into the eye	1	5	9	10
19	Changes the size of the pupil	1	2	5	6
20	Causes most refraction of light rays	4	5	6	11

TEACHERS' NOTES

This test is designed to determine whether or not the student can name the parts of the human eye and their functions.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher, but *in general it should not be more than 80%* (8 out of 10, 12 out of 15, or 16 out of 20). The most important question to ask is: if the test has sets, did the student do poorly on one or more sets? "Poorly" here would usually be taken as 80% (4 out of 5 or 8 out of 10). It is for this reason that the cumulative percentages shown in earlier tests have been dropped for tests after M38.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Set 1: Unfamiliarity with the names of the parts.

Set 2: Lack of knowledge of the functions carried out in the eye.

Related tests:

M4	Identifying the parts of the human body.
M9 and M10	Identifying the bones of a human skeleton

Related skills for which tests have not been prepared:

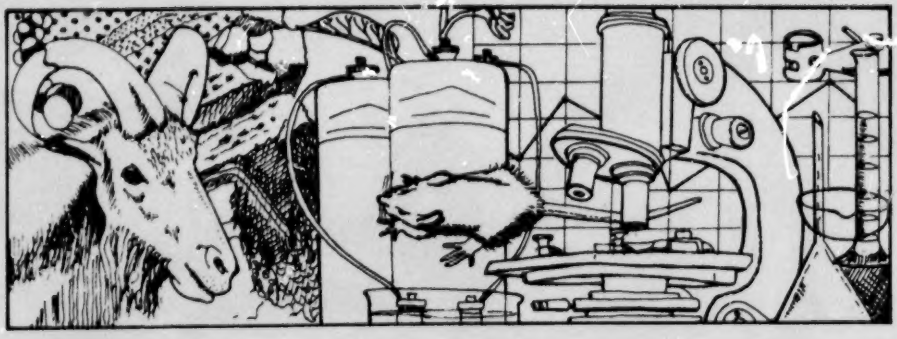
Dissecting an eye.
Naming the parts of a real eye and their functions.

M55

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAM



A MASTERY TEST FOR
THE ABILITY TO

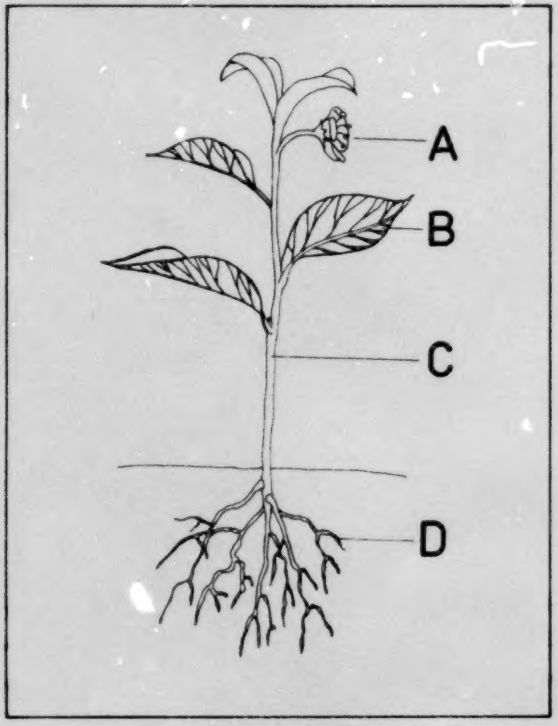
IDENTIFY THE FUNCTIONS
OF PARTS OF A PLANT

PARTS OF A PLANT

This test will test your ability to identify the functions of parts of a plant.

For each question choose the correct answer, and mark its letter (A,B,C or D) on your answer sheet.

Use the diagram below to answer the questions in this test.



SET 1: Choose the part of the plant where the following occurs:

Q	Event/Process Occurring	PART OF PLANT			
1.	Where is water absorbed by the plant?	A	B	C	D
2.	Where are the reproductive organs of the plant?	A	B	C	D
3.	Where is water given off by a plant?	A	B	C	D
4.	Where is most of the conducting tissue?	A	B	C	D
5.	Where does the plant make its food?	A	B	C	D
6.	Where are gases exchanged with atmosphere?	A	B	C	D
7.	Where does the plant obtain salts and minerals?	A	B	C	D
8.	What part supports the plant?	A	B	C	D
9.	Where are food and water going past each other in opposite directions?	A	B	C	D
10.	Where is the fruit made?	A	B	C	D

SET 2: Where do the following processes occur?

Ques.	Process	PART OF PLANT			
11.	Photosynthesis	A	B	C	D
12.	Osmosis	A	B	C	D
13.	Transpiration	A	B	C	D
14.	Fertilisation	A	B	C	D
15.	Diffusion of gases	A	B	C	D

TEACHERS' NOTES

This test is designed to determine whether or not the student can identify the functions of the different parts of a flowering plant.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher, but *in general it should not be more than 80%* (8 out of 10, 12 out of 15, or 16 out of 20). The most important question to ask is: if the test has sets, did the student do poorly on one or more sets? "Poorly" here would usually be taken as 80% (4 out of 5 or 8 out of 10). It is for this reason that the cumulative percentages shown in earlier tests have been dropped for tests after M38.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Set 1:	Lack of knowledge of the functions named OR their sites.
Set 2:	Unfamiliarity with the technical terms used. This may be checked by comparisons with questions in Set 1.

Related Tests:

021026	Identifying the parts of a flower.
021027	Naming the parts of a flower.

Related skills for which tests have not been prepared:

Identifying the parts of a plant (See Practical Testing Guide p. 25).

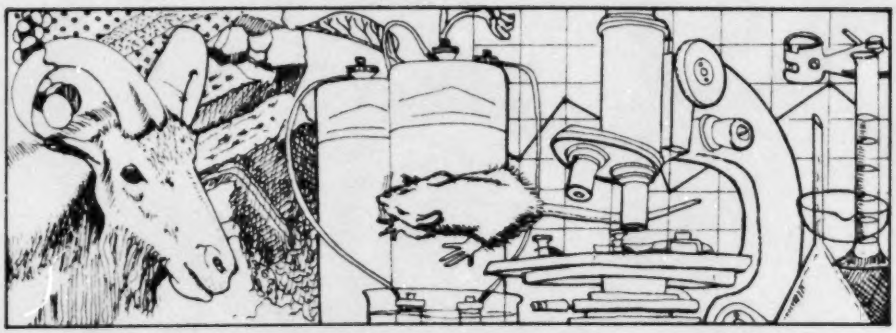
SPECIAL NOTE: In some cases, it may be preferable to leave Set 2 until later, when the technical terms have been introduced.

M56

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAM



A MASTERY TEST FOR
THE SKILL OF

INTERPRETING FOOD TEST RESULTS

FOOD TESTS

This test will measure your ability to interpret the results of food tests.

For each question choose the correct answer and write the letter (A,B,C or D) on your answer sheet.

Set 1 Which substance is present in a food if a positive result is obtained with each of the indicators used?

INDICATOR USED	SUBSTANCE PRESENT			
	A	B	C	D
1.Iodine solution	starch	sucrose	fats + oils	protein
2.Biuret reagent	starch	sucrose	fats + oils	protein
3.Benedict's solution + acid	starch	sucrose	oils	protein
4.Sudan III	starch	glucose	oils	protein
5.Benedict's solution	starch	glucose	oils	sucrose

Set 2 In questions 6-10 choose the test indicator which would give a positive result when added to each food type mentioned.

FOOD TESTED	INDICATORS USED			
	A	B	C	D
6.Starch	Benedict's solution	Iodine solution	Biuret reagent	Sudan III
7.Sucrose	Benedict's solution	Benedict's + acid	Iodine solution	Biuret reagent
8.Protein	Benedict's solution	Iodine solution	Biuret reagent	Sudan III
9.Fats & Oils	Benedict's solution	Iodine solution	Biuret reagent	Sudan III
10.Glucose	Benedict's solution	Biuret reagent	Iodine solution	Sudan III

Set 3 Which is the correct result for each test used in questions 11 to 15?

TEST USED		RESULTS OF TEST			
INDICATOR	FOOD	A	B	C	D
11. Benedict's solution	sucrose	blue to red	no change	blue to clear	red to blue
12. Iodine solution	glucose	brown to black	red to black	no change	clear to red
13. Biuret reagent	protein	lt. blue to dark blue	dk. blue to light blue	clear to blue	no change
14. Sudan III	olive oil	clear to black	clear to red	red to clear	no change
15. Iodine solution	starch	blue to black	clear to brown	brown to black	blue to brown

(lt. = light / dk. = dark)

Set 4 In questions 16-20 which substance is identified by the test result indicated?

TEST RESULT	SUBSTANCE			
	A	B	C	D
16. Gives no reaction with Benedict's solution until acid is added during heating.	glucose	protein	starch	sucrose
17. Turns a deep blue when added to Biuret reagent.	glucose	oil	protein	sucrose
18. Turns a black colour when drops of iodine solution are placed in the food.	glucose	oil	protein	starch
19. Turns a red colour when heated with Benedict's solution.	glucose	oil	protein	starch
20. Turns red when Sudan III is added.	glucose	oil	protein	starch

TEACHERS' NOTES

This test is designed to determine whether or not the student can interpret the results of food tests.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher, but *in general it should not be more than 80%* (8 out of 10, 12 out of 15, or 16 out of 20). The most important question to ask is: if the test has sets, did the student do poorly on one or more sets? "Poorly" here would usually be taken as 80% (4 out of 5 or 8 out of 10). It is for this reason that the cumulative percentages shown in earlier tests have been dropped for tests after M38.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Unfamiliarity with the "indicators" referred to in the test.
Unfamiliarity with the correct positive test results.

Related skills for which tests have not been prepared:

Carrying out the food tests mentioned in the test (See "Practical Testing Guide" p. 33)

Testing for Vitamin C.

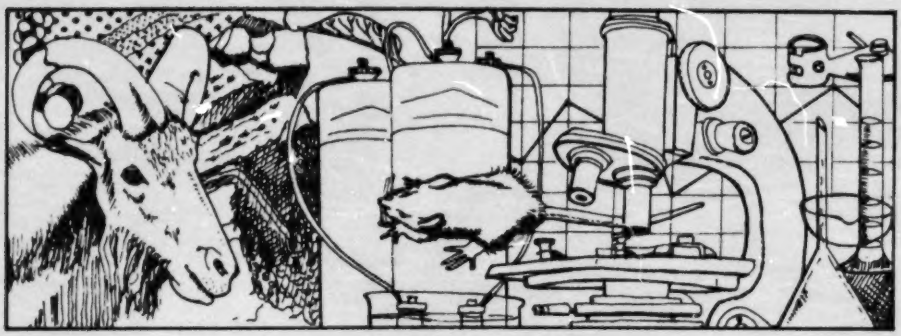
Using other (less safe) food test reagents.

M57

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAM



A MASTERY TEST FOR
THE SKILL OF

APPLYING THE THEORY OF
MECHANICAL ADVANTAGE

MECHANICAL ADVANTAGE - PULLEYS

This test is designed to measure your ability to understand the *theory of mechanical advantage* as it applies to pulleys.
Read the theory below and then use it and the diagrams to answer the questions.

THEORY

The mechanical advantage of a pulley system indicates the load which can be lifted by the pulley system compared with the effort used. For example, a system with a mechanical advantage of two, can lift a weight twice as great as the effort used.

The mechanical advantage of a pulley system can be measured in several ways:

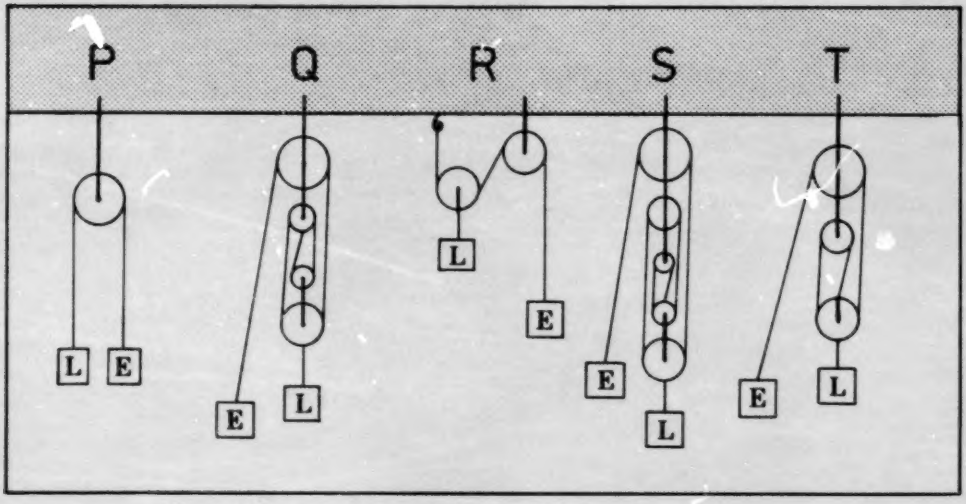
(A) mechanical advantage = $\frac{\text{load lifted}}{\text{effort applied}}$

(B) mechanical advantage * = number of pulleys in the system.

(C) mechanical advantage * = $\frac{\text{distance moved by effort}}{\text{distance moved by load}}$

* THESE TWO DEFINITIONS ARE OF *VELOCITY RATIO* IF FRICTION IS NOT IGNORED. IN THIS TEST, FRICTION IS, AND SO IT IS CORRECT TO USE MECHANICAL ADVANTAGE.

The questions which follow (1 - 20) refer to these diagrams of pulley systems.



SET 1: What is the mechanical advantage of each pulley system?

Question	SYSTEM	A	B	C	D
1	P	1	2	3	4
2	Q	1	2	3	4
3	R	1	2	3	4
4	S	2	3	4	5
5	T	2	3	4	5

SET 2: What load could be lifted by the effort indicated in each system

Question	System	Effort	LOAD (kg)			
			A	B	C	D
6	P	10 kg	20	20	30	40
7	Q	20 kg	20	40	60	80
8	R	30 kg	15	30	45	60
9	S	20 kg	40	60	80	100
10	T	10 kg	30	31	50	60

SET 3: What effort is required to lift each load indicated for each system?

Question	System	Load	EFFORT (kg)			
			A	B	C	D
11	P	15 kg	7.5	10	15	30
12	Q	40 kg	10	20	80	160
13	R	80 kg	10	20	40	160
14	S	5 kg	1	20	25	50
15	T	30 kg	6	10	60	90

STOP HERE UNLESS TOLD TO GO ON BY YOUR TEACHER

SET 4: If in lifting a load, the effort moves through the distance indicated for each system, what distance is moved by the load?

Question	System	Distance moved by effort (cm)	Distance moved by load (cm)			
			A	B	C	D
16	P	10	5	10	15	20
17	Q	20	5	20	40	80
18	R	30	7.5	10	15	60
19	S	40	8	40	120	200
20	T	60	10	15	20	30

TEACHERS' NOTES

This test is designed to determine whether or not the student can apply the theory of mechanical advantage as stated in the test.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher, but *in general it should not be more than 80%* (8 out of 10, 12 out of 15, or 16 out of 20). The most important question to ask is: if the test has sets, did the student do poorly on one or more sets? "Poorly" here would usually be taken as 80% (4 out of 5 or 8 out of 10). It is for this reason that the cumulative percentages shown in earlier tests have been dropped for tests after M38.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Set 1:	The number of pulleys may not have been used.
Sets 2,3 & 4:	The m.a. may have been miscalculated
	The "formula" in (A) may have been mistransposed.

Related skills for which tests have not been prepared:

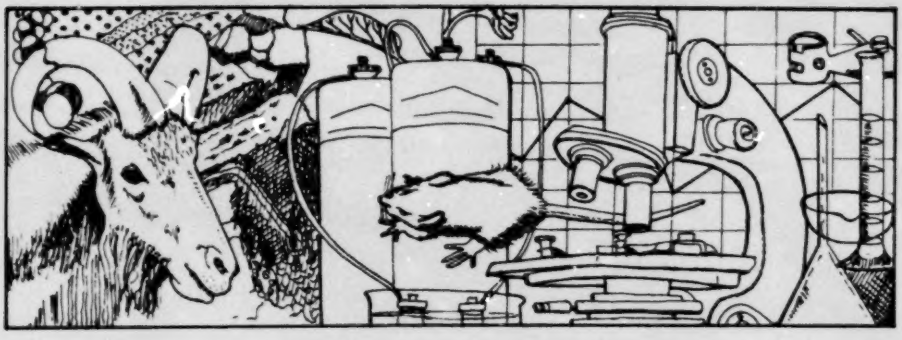
Calculating mechanical advantage
Designing pulley systems of specified mechanical advantage
Constructing pulley systems of specified mechanical advantage
Calculating efficiency in pulley system
Work with levers, screws, "wheels and axles".
(See "Practical Testing Guide" p. 37)

M58

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAM

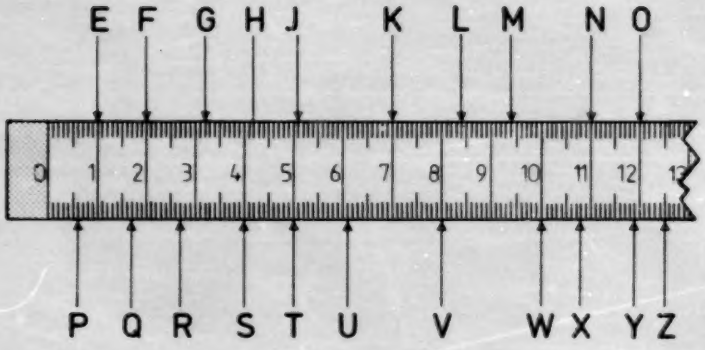


A MASTERY TEST FOR
THE SKILL OF

READING A LINEAR RULE

READING A LINEAR RULE

All the questions in this test refer to this picture of part of a metric rule.



SET 1

In the next ten questions, an arrow is named, and four possible measurements are given. Choose the measurement which fits the arrow, and mark its letter (A, B, C or D) on your answer sheet.

Question	Arrow	MEASUREMENT			
		A	B	C	D
1	F	1.2	2.0	2.1	12.0
2	H	4.2	42	14.2	142
3	J	0.5	1.5	5.1	5.5
4	K	0.7	1.7	7.0	70
5	L	1.8	1.84	7.9	8.4
6	O	1.2	2.0	2.1	12.0
7	R	0.7	1.7	2.7	27
8	W	1.0	9.1	9.9	10.0
9	X	1.08	1.8	10.7	10.8
10	Z	0.5	1.25	11.25	12.5

SET 2

In the next ten questions, a point on the scale is given, and four possible positions are named by letter. Choose the arrow which marks the point on the scale, and find the answer column (A, B, C or D) which includes your answer. Mark your answer (A, B, C or D) on your answer sheet.

Question	Measurement	ANSWER COLUMN			
		A	B	C	D
11	1.0 cm	E	N	T	W
12	4.0 cm	H	M	S	V
13	5.0 cm	Q	T	X	Z
14	8.0 cm	J	O	V	X
15	11.0 cm	E	N	O	W
16	0.6 cm	F	K	L	P
17	1.7 cm	F	P	Q	R
18	3.2 cm	G	H	R	S
19	9.4 cm	L	M	N	W
20	11.9 cm	F	L	X	Y

TEACHERS' NOTES

This test is designed to determine whether or not the student can read a linear scale.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher, but *in general it should not be more than 80%* (8 out of 10, 12 out of 15, or 16 out of 20). The most important question to ask is: if the test has sets, did the student do poorly on one or more sets? "Poorly" here would usually be taken as 80% (4 out of 5 or 8 out of 10). It is for this reason that the cumulative percentages shown in earlier tests have been dropped for tests after M38.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Confusion between millimetres and centimetres.
Difficulty with finer divisions.

Related tests:

M42	Estimating metric length.
M59	Reading a circular scale.

Related skills for which tests have not been prepared:

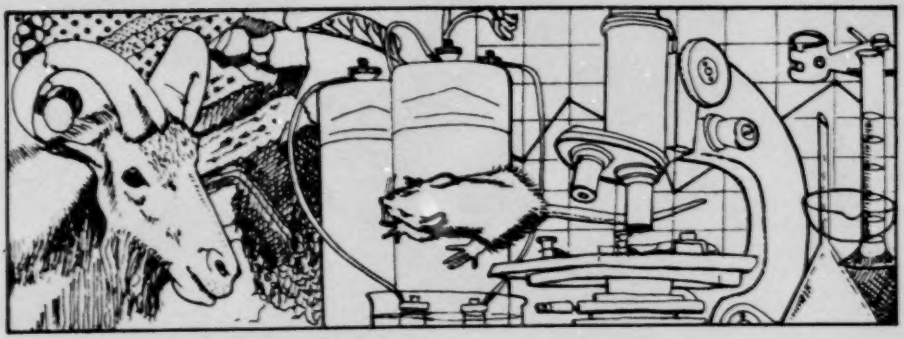
Measuring length (See "Practical Testing Guide" pp. 42 & 43)
Using scales and instruments (See "Practical Testing Guide" p.45)

M59

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAM

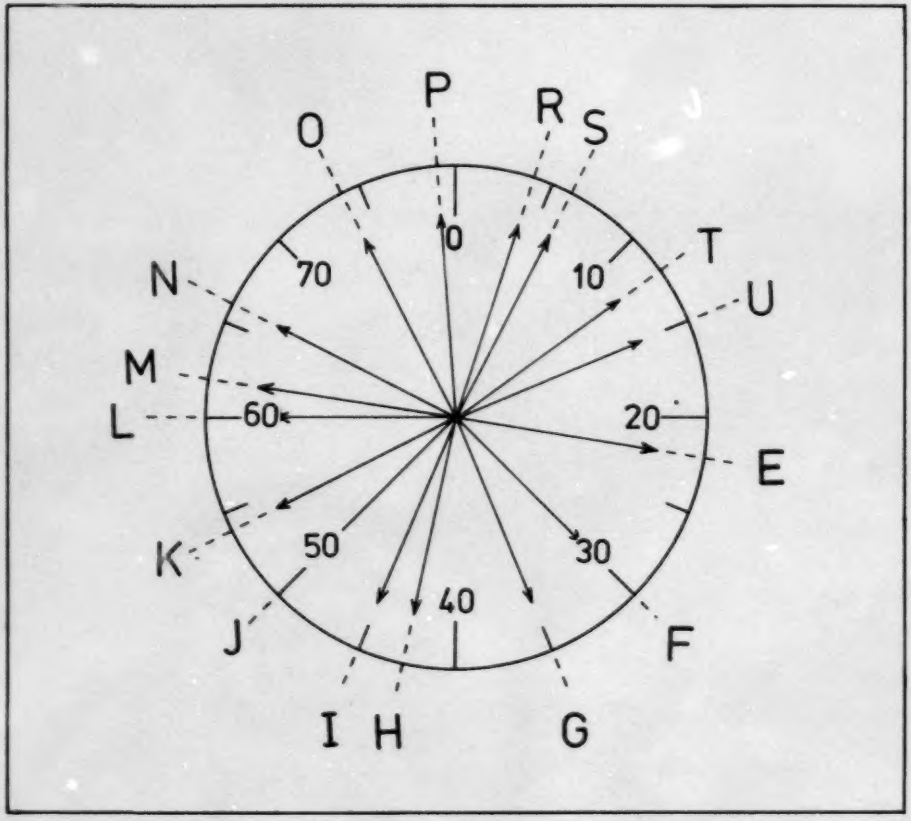


A MASTERY TEST FOR THE SKILL OF READING A CIRCULAR SCALE

READING A CIRCULAR SCALE

This test is designed to measure your ability to read a circular scale.

The questions on the opposite page refer to this diagram of a circular scale similar to that found on speedometers, ammeters, protractors and compasses.



SET 1

In the next ten questions, you are given a reading, and the letters which indicate four arrows. Choose the arrow which marks the reading, and see which ANSWER COLUMN (A, B, C or D) it appears in. Mark that letter on your answer sheet.

Question	Reading	ANSWER COLUMNS			
		A	B	C	D
1	45	I	K	L	R
2	15	R	S	T	U
3	6	K	L	M	S
4	62	L	M	N	S
5	79	M	N	O	P
6	4	O	P	R	S
7	35	F	G	H	J
8	22	E	G	R	S
9	67	L	M	N	O
10	50	J	K	R	S

SET 2

In the next ten questions, an arrow is indicated, together with four possible readings. Choose the correct reading, and write its letter (A, B, C or D) on your answer sheet.

Question	Reading	ANSWER COLUMNS			
		A	B	C	D
11	F	3	13	30	33
12	I	42.5	45	50	55
13	K	50.4	54	58	60
14	N	60	62	66	72
15	T	10.25	10.5	12	15
16	H	40	41	42.5	45
17	O	74	75	77	78
18	L	55	60	61	65
19	M	6.2	60.25	62	62.5
20	P	1	2	78	79

TEACHERS' NOTES

This test is designed to determine whether or not the student can read a circular scale.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher, but *in general it should not be more than 80%* (8 out of 10, 12 out of 15, or 16 out of 20). The most important question to ask is: if the test has sets, did the student do poorly on one or more sets? "Poorly" here would usually be taken as 80% (4 out of 5 or 8 out of 10). It is for this reason that the cumulative percentages shown in earlier tests have been dropped for tests after M38.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Reading in the wrong direction.
Unfamiliarity with such scales.

Related tests:

M58	Reading a linear scale.
021031	Reading circular scales (2)

Related skills for which tests have not been prepared:

Reading actual circular scales
- Ammeters
- Voltmeters
- Speedometers
- Gas meters
- Electricity meters etc.

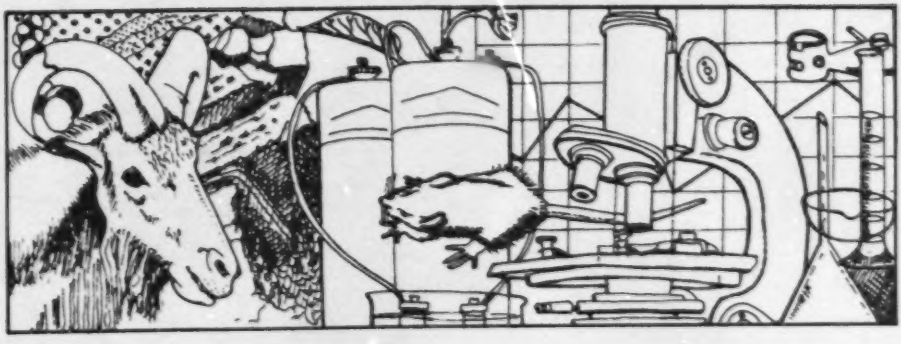
See "Practical Testing Guide" p.45

M60

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAM



A MASTERY TEST FOR
THE SKILL OF

PREDICTING F_1 RATIOS IN GENETICS

F_1 RATIOS

This test is designed to measure:

a. your ability to predict the appearance of the offspring of some genetic crosses given the characteristics of the parents;

b. your ability to deduce parent characteristics given the appearance of the offspring.

Use this information to answer the questions which follow:

> The Petemac is a small mammal which may have a black coat or white coat, and the coat may be coarse or fluffy. It has been shown that black is dominant to white, and coarse is dominant to fluffy.
>
> The term "pure-breeding" is used to indicate any animal which contains only the dominant form, or only the recessive form. "Impure" means that the animal being studied is carrying one gene for each form.

Set 1

In the next five questions, choose the correct description of the offspring of the cross which is described. Mark its letter (A, B, C or D) on your answer sheet.

QUESTION	PARENTAL CROSS	OFFSPRING DESCRIPTIONS			
		A	B	C	D
1	pure coarse x pure fluffy	all coarse	all fluffy	½ coarse ½ fluffy	¾ coarse ¼ fluffy
2	impure coarse x pure fluffy	all coarse	all fluffy	½ coarse ½ fluffy	¼ coarse ¾ fluffy
3	pure black x pure white	all black	all white	½ black ½ white	¼ black ¾ white
4	impure black x pure white	all black	all white	½ black ½ white	¼ black ¾ white
5	impure black x impure black	all black	all white	½ black ½ white	¾ black ¼ white

Set 2

In the next five questions, choose the correct description of the offspring of the cross which is described. Mark its letter (A, B, C or D) on your answer sheet.

QUESTION	PARENTAL CROSS	OFFSPRING DESCRIPTIONS			
		A	B	C	D
6	pure black, coarse x, pure white, fluffy	all black coarse	all black fluffy	all white coarse	all white fluffy
7	pure black, impure coarse x pure white, fluffy	some black coarse, some white coarse	some black coarse, some black fluffy	some white coarse, some white fluffy	some black fluffy some white coarse

Set 2 (continued)

QUESTION	PARENTAL CROSS	OFFSPRING DESCRIPTIONS			
		A	B	C	D
8	impure black, pure coarse x pure white, fluffy	some black coarse-some white fluffy	some black fluffy, some white coarse	some black coarse, some white coarse	some black fluffy, some white fluffy
9	pure black, coarse x pure white, coarse	all black coarse,	some black coarse, some white coarse	some black fluffy, some white fluffy	all white coarse
10	impure black, pure fluffy x pure white, impure coarse	all white fluffy	all black coarse	black coarse and fluffy and white coarse and fluffy	some black coarse and some white fluffy only

Set 3

For each question, choose the most likely parents for the offspring given. Mark the letter (A, B, C or D) for your answer on your answer sheet.

QUESTION	OFFSPRING	POSSIBLE PARENTS			
		A	B	C	D
11	black, fluffy	pure black coarse x pure white coarse	pure black coarse x pure white fluffy	pure black fluffy x pure white coarse	pure black fluffy x white fluffy
12	white coarse	pure black coarse x pure white coarse	impure black pure fluffy x pure white fluffy	impure black coarse x pure white fluffy	pure black fluffy x white coarse
13	black coarse	pure black coarse x pure white fluffy	impure black, fluffy, pure white fluffy	pure black fluffy x pure white fluffy	pure white impure fluffy x pure white coarse
14	white fluffy	pure black coarse x pure white fluffy	impure black, coarse x pure white fluffy	pure black, fluffy x pure white fluffy	impure black, pure coarse x pure white fluffy
15	black, fluffy and white fluffy in the same litter	pure black fluffy x pure white coarse	impure black, pure fluffy x pure white fluffy	pure black, coarse x pure white, fluffy	impure black, pure coarse x pure white fluffy

TEACHERS' NOTES

This test is designed to determine whether or not the student can manipulate information about standard genetic crosses.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher, but *in general it should not be more than 80%* (8 out of 10, 12 out of 15, or 16 out of 20). The most important question to ask is: if the test has sets, did the student do poorly on one or more sets? "Poorly" here would usually be taken as 80% (4 out of 5 or 8 out of 10). It is for this reason that the cumulative percentages shown in earlier tests have been dropped for tests after M38.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Set 1: This set is based on monohybrid crosses. Low scores in this set will indicate the need for further discussion with the individual student.

Set 2: Low scores here but not in Set 1 may indicate problems in manipulating two variables at once.

Set 3: Low scores here may indicate problems in analysing a complex situation.

Related tests:

021056 Completing a genetic table.
021069 Interpreting family trees in genetics.

Related skills for which tests have not been prepared:

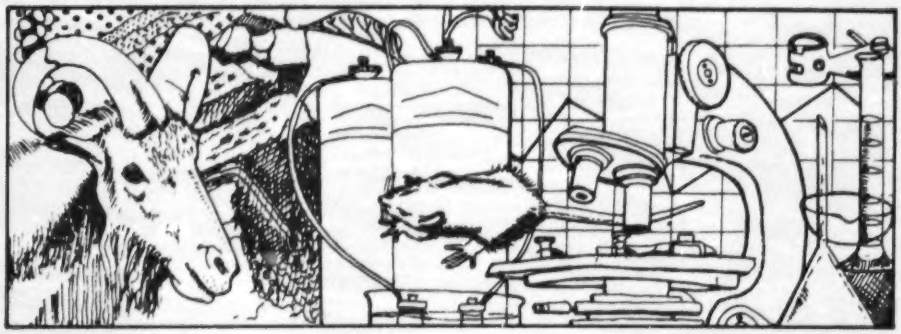
Conducting breeding experiments.
Predicting the outcome of breeding experiments.

M61

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAM

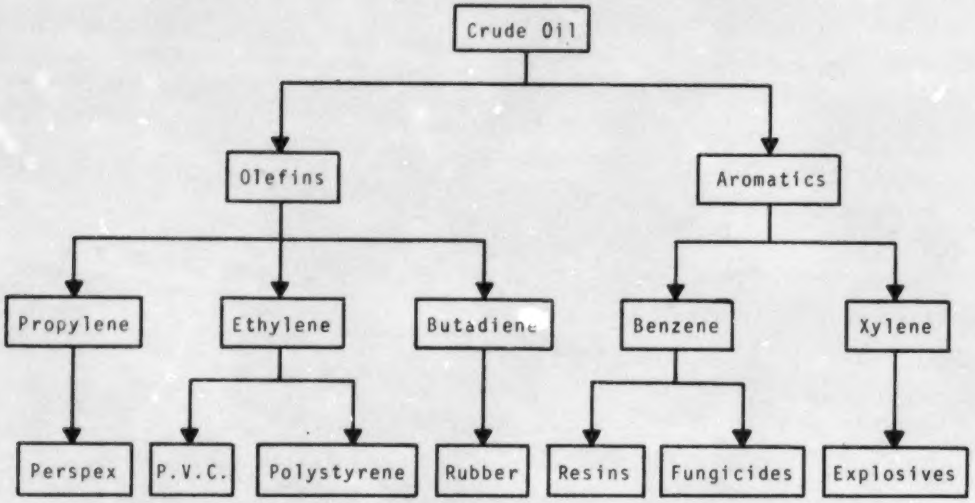


A MASTERY TEST FOR
THE SKILL OF
READING A FLOW DIAGRAM

READING A FLOW DIAGRAM

This test is designed to measure your ability to read a flow diagram.

All questions in this test refer to the flow chart below.



For each question choose the alternative that best completes the statement and write its letter (A, B, C or D) on your answer sheet.

Set 1

QUESTION	STATEMENT	A	B	C	D
1.	Perspex is made from	P.V.C.	Propylene	Ethylene	Benzene
2.	Rubber can be made from	Olefins	Ethylene	Benzene	Aromatics
3.	Aromatics can be made from	Benzene	Oil	Xylene	Olefins
4.	Fungicides can be made from	Xylene	Resins	Olefins	Oil
5.	Butadiene can be made from	Rubber	P.V.C.	Olefins	Benzene
6.	Ethylene can be used to make	Perspex	Olefins	P.V.C.	Oil
7.	Aromatics can be used to make	Oil	Benzene	Olefins	Rubber

QUESTION	STATEMENT	A	B	C	D
8.	Olefins can be used to make	Rubber	Oil	Benzene	Resins
9.	Xylene can be used to make	Aromatics	Benzene	Resins	Explosives
10.	Butadiene can be used to make	Olefins	Oil	Rubber	Resins

Set 2

QUESTION	STATEMENT	A	B	C	D
11.	The number of stages in making Aromatics from Oil is	1	2	3	4
12.	The number of stages in making Resins from Oil is	1	2	3	4
13.	The number of stages in making Rubber from Butadiene is	1	2	3	4
14.	The number of stages in making Fungicides from Aromatics is	1	2	3	4
15.	The number of stages in making P.V.C. from Olefins is	1	2	3	4

TEACHERS' NOTES

This test is designed to determine whether or not the student can follow a simple flow diagram.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher, but *in general it should not be more than 80%* (8 out of 10, 12 out of 15, or 16 out of 20). The most important question to ask is: if the test has sets, did the student do poorly on one or more sets? "Poorly" here would usually be taken as 80% (4 out of 5 or 8 out of 10). It is for this reason that the cumulative percentages shown in earlier tests have been dropped for tests after M38.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Set 1: Unfamiliarity with conventions of flow chart representation
Set 2: Uncertainty about whether to count each of the "boxes" or each of the "arrows".

Related tests:

M2	Constructing a biological key
M62	Using a flow chart of physical processes
M63	Interpreting a flow chart of operations
021048	Interpreting an evolutionary family tree

Related skills for which tests have not been prepared:

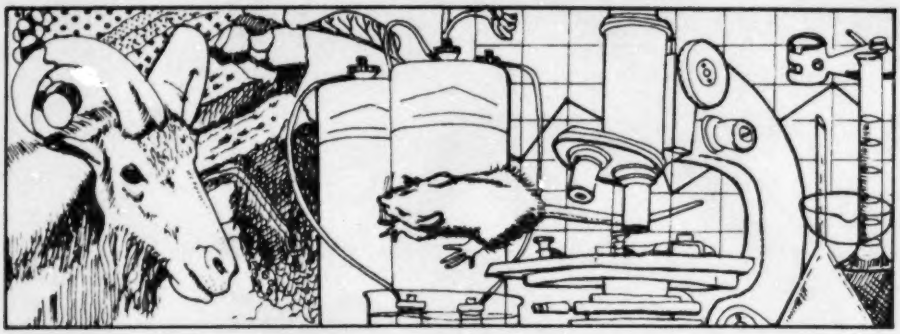
Constructing a flow chart.
Using a more complex flow chart
Organic synthesis

M62

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAM

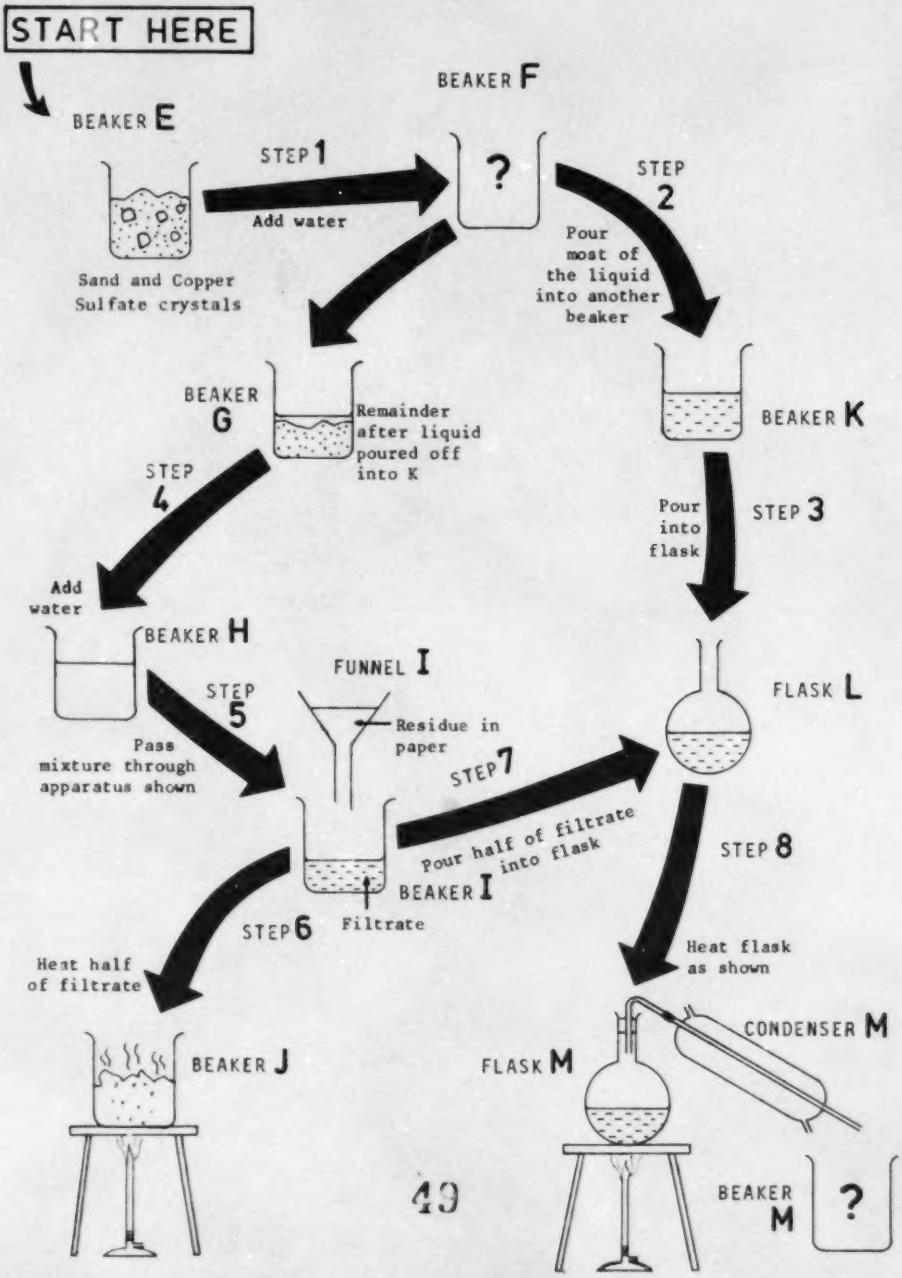


A MASTERY TEST FOR
THE SKILL OF
USING A FLOW CHART
OF PHYSICAL PROCESSES

USING A FLOW CHART

This test is designed to measure your ability to follow a flow chart. For each question choose the correct answer and write the letter (A, B, C or D) on your answer sheet.

The questions on the opposite page refer to the flow chart below.



SET 1 What would you most likely find in the beaker in the situation indicated?

Question	BEAKER	A	B	C	D
1.	F	Sand Water	Sand Copper Sulfate crystals, Water	Copper Sulfate crystals, Water	Sand, Copper Sulfate solution
2.	K	Water	Sandy water	Copper Sulfate solution	Pure Copper Sulfate
3.	I	Water	Sand and Water	Copper Sulfate solution	Pure Copper Sulfate
4.	J	Sand	Water	Sand and Water	Copper Sulfate Solution
5.	M	Sand	Water	Copper Sulfate crystals	Copper Sulfate solution

SET 2 In which situation would the beaker contain the mixture specified?

Question	Mixture	A	B	C	D
6.	Sand, Copper Sulfate Solution	E	F	K	M
7.	Solution of Copper Sulfate in Water	F	G	I	M
8.	Pure Water	K	J	H	M
9.	Copper Sulfate crystals only	F	I	J	L
10.	Mixture of Sand and Copper Sulfate crystals	E	F	I	J

SET 3 What is the step in the flow chart at which the following processes are carried out?

Question	Process	A	B	C	D
11	Decantation	2	3	4	5
12	Crystallization	5	6	7	3
13	Filtration	3	4	5	7
14	Distillation	1	3	5	8
15	Evaporation	4	5	6	8

TEACHERS' NOTES

This test is designed to determine whether or not the student can follow a more complex flow chart.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher, but *in general it should not be more than 80%* (8 out of 10, 12 out of 15, or 16 out of 20). The most important question to ask is: if the test has sets, did the student do poorly on one or more sets? "Poorly" here would usually be taken as 80% (4 out of 5 or 8 out of 10). It is for this reason that the cumulative percentages shown in earlier tests have been dropped for tests after M38.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Set 1, 2, and 3	Problems with diagram interpretation Unfamiliarity with situation described
Set 3	Unfamiliarity with terms used.

Related tests:

M2	Using a biological key
M61	Reading a flow diagram
M63	Interpreting a flow chart of operations.

Related skills for which tests have not been prepared:

Drawing flow charts
Performing the laboratory work included in the flow chart.

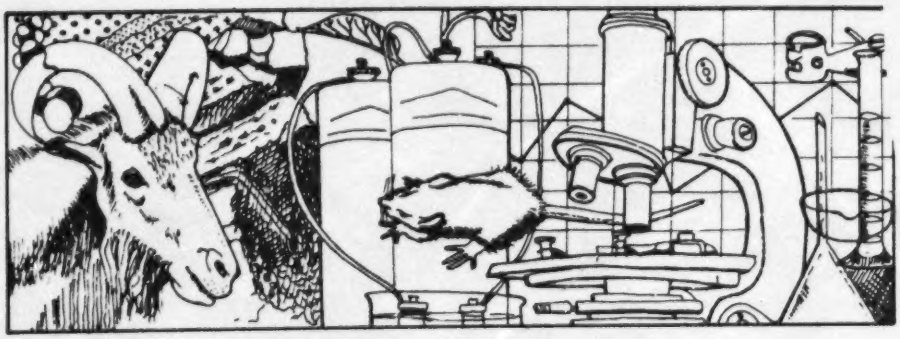
SPECIAL NOTE: Performance on this test may be drastically altered by prior experience with the processes involved. Teachers may need to take this into account.

M63

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAM

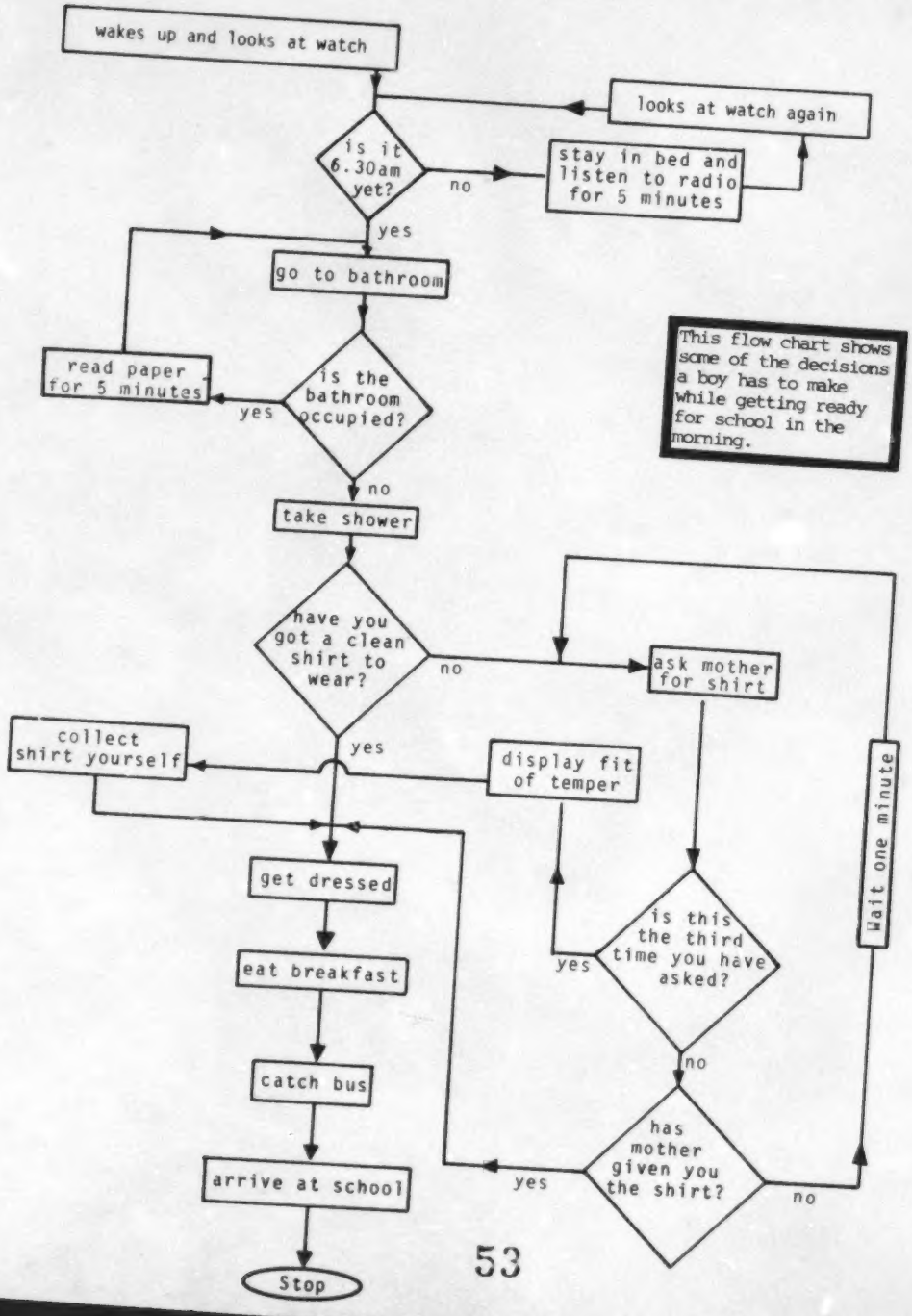


A MASTERY TEST FOR
THE SKILL OF

INTERPRETING A
FLOW CHART OF OPERATIONS

FLOW CHART

This test is designed to measure your ability to understand and follow the steps in a flow chart.
For each question on the opposite page, choose the answer (A,B,C, or D) and mark it on your answer sheet.
Use the flow chart below to answer each question.



Question	A	B	C	D
1. When does the boy stay in bed and listen to the radio?	If it is earlier than 6.30 a.m.	At 6.30.	When he wakes up.	Before going to the bathroom.
2. What does the boy do after listening to the radio?	Stays in bed for 5 minutes.	Reads the paper for 5 minutes.	Looks at his watch again.	Goes to the bathroom.
3. What does the boy do after his showering?	Gets dressed.	Gets cranky.	Looks for a clean shirt.	Asks mother for a clean shirt.
4. If the boy has asked his mother for a shirt twice and still hasn't got one, what does he do then?	Gets cranky,	Waits one minute	Gets his own shirt.	Collects the shirt himself.
5. What does the boy do after getting a shirt from his mother?	Waits one minute.	Gets cranky.	Collects a shirt himself.	Gets dressed.
6. When would the boy read the paper for 5 minutes?	Before showering.	After listening to the radio.	If the bathroom was occupied.	After going to the bathroom.
7. What does the boy do when he first wakes up?	Looks at the clock.	Switches on the radio.	Reads the paper.	Goes to the bathroom.
8. What does the boy do after reading the paper?	Goes to bed for 5 minutes.	Goes back to the bathroom.	Looks for a clean shirt.	Has a shower.
9. What does the boy do just before eating breakfast?	Gets dressed.	Catches the bus.	Has a shower.	Looks for a clean shirt.
10 What does the boy do if mother doesn't get his shirt after asking three times?	Waits one minute then asks again.	Gets dressed.	Asks again straight away.	Gets cranky, then gets his own shirt.

TEACHERS' NOTES

This test is designed to determine whether or not the student can follow a complex flow chart of operations.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher, but *in general it should not be more than 80%* (8 out of 10, 12 out of 15, or 16 out of 20). The most important question to ask is: if the test has sets, did the student do poorly on one or more sets? "Poorly" here would usually be taken as 80% (4 out of 5 or 8 out of 10). It is for this reason that the cumulative percentages shown in earlier tests have been dropped for tests after M38.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Lack of familiarity with flow charts.

Related tests:

M2	Using a biological key.
M61	Reading a flow diagram
M62	Using a flow chart of physical processes.

Related skills for which tests have not been prepared

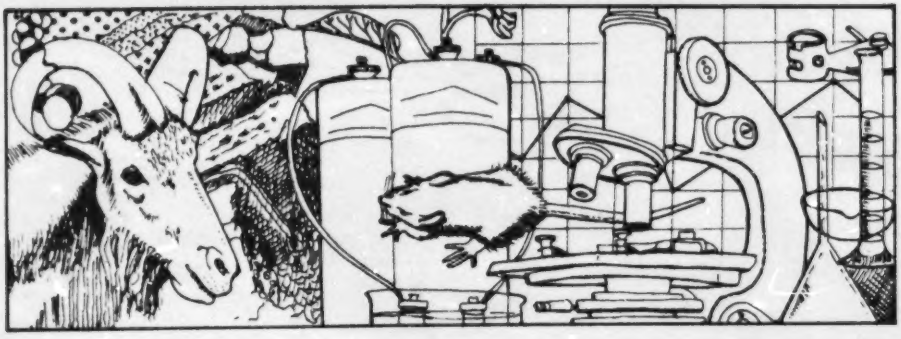
Constructing a flow chart from given data

M64

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAM



A MASTERY TEST FOR

THE SKILL OF

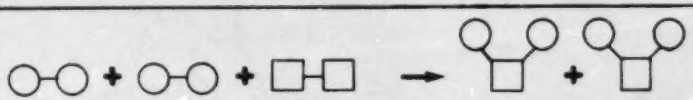
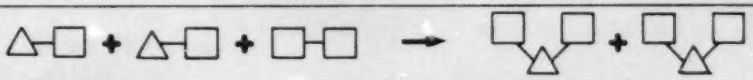
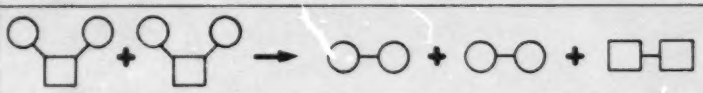
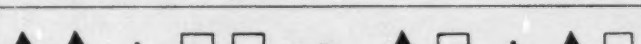
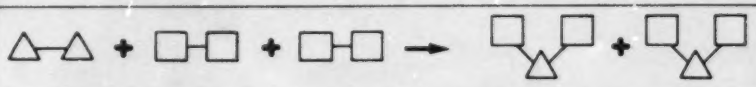
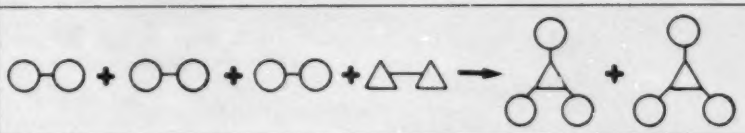
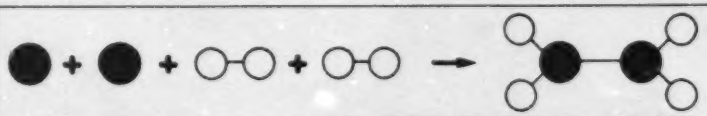
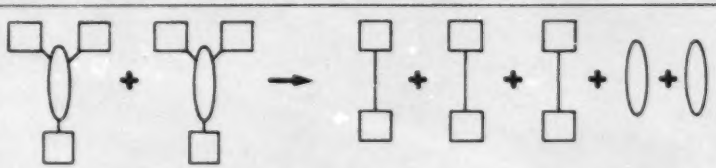
USING CODES (3)

56

USING CODES -3

This test is designed to measure your ability to use a code which represents chemical equations. Your performance will be affected by your understanding of chemical equations.

The questions on the opposite page refer to the diagrams below.

Equation Number	Coded Equation
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

The questions on this page refer to the diagrams on the opposite page. For each question, choose the correct answer and mark its letter (A,B,C or D) on your answer sheet.

Set 1: Which chemical equation below matches the coded equation opposite? Mark its letter (A,B,C or D) on your answer sheet.

Question	Coded Equation	Chemical Equation	
1.	6	A. $2C + O_2 \rightarrow 2CO$ B. $C + O_2 \rightarrow CO_2$	C. $2H_2O \rightarrow 2H_2 + O_2$ D. $NO + O_2 \rightarrow NO_2 + O$
2.	7	A. $2O_2 + O_2 \rightarrow 2O_3$ B. $C + 2H_2 \rightarrow CH_4$	C. $2Zn + O_2 \rightarrow 2ZnO$ D. $3H_2 + N_2 \rightarrow 2NH_3$
3.	8	A. $O_2 + 2H_2 \rightarrow 2H_2O$ B. $2NO + O_2 \rightarrow 2NO_2$	C. $2S + 3O_2 \rightarrow 2SO_3$ D. $2C + 2H_2 \rightarrow C_2H_4$
4.	9	A. $PbO_2 \rightarrow Pb + O_2$ B. $2MgO \rightarrow 2Mg + O_2$	C. $H_2 + O_2 \rightarrow H_2O_2$ D. $2HCl \rightarrow Cl_2 + O_2$
5.	10	A. $2NH_3 \rightarrow 3H_2 + N_2$ B. $2H_2O \rightarrow 2H_2 + O_2$	C. $2PCl_3 \rightarrow 3Cl_2 + 2P$ D. $2AgO \rightarrow 2Ag + O_2$

Set 2: Which coded question from page 2 matches the chemical equations below? Find the number of the coded equation and mark its letter (A,B,C or D) on your answer sheet.

Example: $H_2 + Cl_2 \rightarrow 2HCl$

is coded as:

Question	Chemical Equation	Possible Answers			
		A	B	C	D
6.	$2H_2 + O_2 \rightarrow 2H_2O$	1	2	3	4
7.	$2H_2O \rightarrow 2H_2 + O_2$	1	2	3	5
8.	$N_2 + O_2 \rightarrow 2NO$	1	2	3	4
9.	$2NO + O_2 \rightarrow 2NO_2$	1	2	3	4
10.	$N_2 + 2O_2 \rightarrow 2NO_2$	2	3	4	5

TEACHERS' NOTES

This test is designed to determine whether or not the student can apply a complex code in the context of chemical equations.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher, but *in general it should not be more than 80%* (8 out of 10, 12 out of 15, or 16 out of 20). The most important question to ask is: if the test has sets, did the student do poorly on one or more sets? "Poorly" here would usually be taken as 80% (4 out of 5 or 8 out of 10). It is for this reason that the cumulative percentages shown in earlier tests have been dropped for tests after M38.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Not distinguishing between monatomic and diatomic molecules.

Misunderstanding the (somewhat complex) instructions.

Lack of familiarity with conventions of equation writing.

Related tests:

M39 Using codes (1)

021071 Using codes (2) (about to be "trialled")

M65 Naming carbon compounds (1)

M66 Naming carbon compounds (2)

Related skills for which tests have not been prepared:

Writing balanced equations.

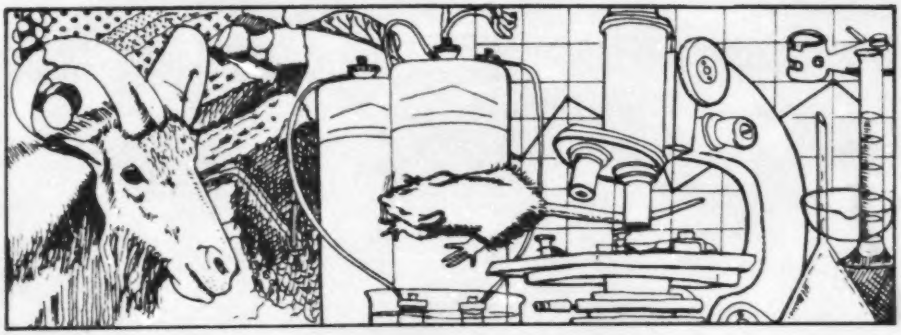
Using symbols to represent named molecules.

M65

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAM



A MASTERY TEST FOR
THE SKILL OF

NAMING CARBON COMPOUNDS (1)

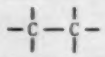
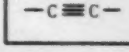
NAMING CARBON COMPOUNDS - 1

This test is designed to measure your ability to apply the rules for naming carbon compounds.
Read the information given in the table below and use it to answer the questions which follow.

Carbon compounds are named using two features of the structure of the molecule

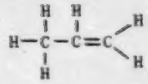
(1) the number of carbon atoms present
(2) the type of distinguishing feature present

Conventions used are shown below.

No. of Carbon Atoms in Compound	Prefix	Distinguishing Feature	Suffix
1	METH-	all single bonds between carbon atoms 	-ANE
2	ETH-		
3	PROP-	one double bond between two carbon atoms	-ENE
4	BUT-		
5	PENT-	one triple bond between two carbon atoms 	-YNE
6	HEX-		

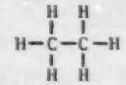
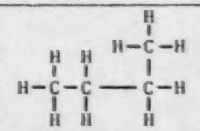
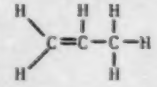
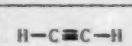
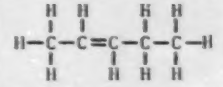
The name of the compound is found by working out which prefix and suffix should be used and simply putting them together.

Now look at the example at the top of the page.

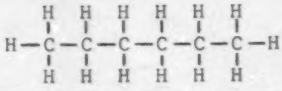
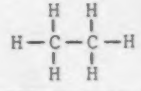
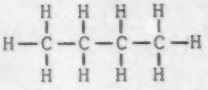
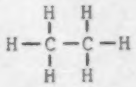
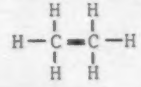
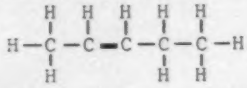
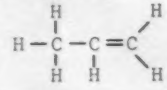
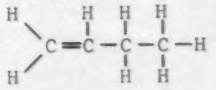
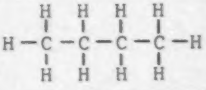
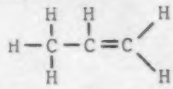
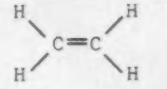
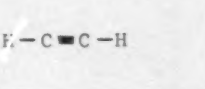
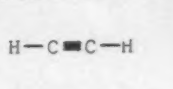
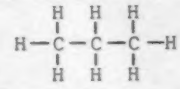
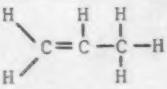
Example: 

Prefix: 3 carbon atoms = Prop-
Suffix: 1 double bond = -ene
Name: Propene

Set 1: Choose the correct name for each of the structures given and mark its letter (A, B, C or D) on your answer sheet.

Q.	STRUCTURE	ANSWERS A	B	C	D
1.		methane	ethane	pentane	hexane
2.		ethane	propane	butane	pentane
3.		ethyne	propane	propene	butyne
4.		ethyne	butyne	methane	propane
5.		hexane	pentyne	butene	pentene

Set 2: Choose the correct structure for each of the substances given, and mark its letter (A, B, C or D) on your answer sheet.

QUESTION	SUBSTANCE	POSSIBLE ANSWERS			
		A	B	C	D
6	hexane				
7	methane				
8	butene				
9	ethene				
10	propyne				

M65/3

TEACHERS' NOTES

This test is designed to determine whether or not the student can apply the IUPAC rules of organic nomenclature.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher, but *in general it should not be more than 80%* (8 out of 10, 12 out of 15, or 16 out of 20). The most important question to ask is: if the test has sets, did the student do poorly on one or more sets? "Poorly" here would usually be taken as 80% (4 out of 5 or 8 out of 10). It is for this reason that the cumulative percentages shown in earlier tests have been dropped for tests after M38.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Difficulties in applying conventions in a scientific context.
Difficulties in distinguishing between features in structural formulae.

Related tests:

M66 Naming carbon compounds (2)

Related skills for which tests have not been prepared:

Identifying organic groups.
Identification of inorganic formulae.
Constructing models of compounds.
Writing chemical formulae.